DATASHEET

Data Center

10G Port Core Switch

Product Data Sheet

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Product Overview

WatchDog Data Center Switch Series — Industry-leading high performance and scalable 10GE access switching solution with modular dual power, fixed or modular uplinks (10GE/40GE/100GE). The series offers OSPF/BGP and multicast, SDN enabled and flexible management.

WatchDog Data Center switch series contains the following models:

- WD-GS-24G2Q: 24 × 1/10G SFP+ ports, 2 × QSFP+ ports (40GE, can be split into four 10GE ports.),2 × expansion slots, 2 × fan tray slots, and 2 × power module slots
- WD-GS-48G2Q: 48 × 1/10G SFP+ ports, 2 × QSFP+ ports (40GE, can be split into four 10GE ports.),2 × expansion slots, 2 × fan tray slots, and 2 × power module slots
- WD-GS-24G2Q28: 24 × 1/10G SFP+ ports, 2 × QSFP28 ports (100G, can be split into four 25GE ports),2 × expansion slots, 2 × fan tray slots, and 2 × power module slots
- WD-GS-48G2Q28: 48 × 1/10G SFP+ ports, 2 × QSFP28 ports (100G, can be split into four 25GE ports),2 × expansion slots, 2 × fan tray slots, and 2 × power module slots
- WD-GS-24G6Q28: 24 × 1/10G SFP+ ports, 6 × QSFP28 ports, 3 × fan tray slots, and 2 × power moduleslots
- WD-GS-48G6Q28: 48 × 1/10G SFP+ ports, 6 × QSFP28 ports, 3 × fan tray slots, and 2 × power moduleslots
- WD-GS-24P4Q28: 24 × 100M/1G/2.5G/5G/10G Base-T PoE++ ports, 4 × QSFP28 ports, 2 kinds of expansion slots (1 large slot in front, 1 normal slot in rear), 2 × fan tray slots, and 2 × powermodule slots

WD-GS-24G2Q

WD-GS-48G2Q

WD-GS-24G2Q28

WD-GS-48G2Q28

WD-GS-24G6Q28

WD-GS-48G6Q28

WD-GS-24P4Q28

Features and Benefits

Open Application Architecture

In WatchDog with open application architecture, the switch can accommodate high-performance OAP modules to offer dedicated services such as firewall, IPS, or load balancing in addition to conventional forwarding services. By installing OAP modules, the customers can use the switch as a multiservice device without having to buy separate service appliances, such as a firewall device.

High-Density 10GE Forwarding

The switch offers high-density 10GE forwarding and can expand 10GE ports flexibly. It provides 48/24*10/1GE autosensing SFP+ ports, six QSFP28 ports or two QSFP28 or QSFP+ ports onboard, and two expansion slots that support up to 11 kinds of modules range from GE to 10GE, 25GE, 40GE,100GE and Multigiga ports. Using a QSFP+ to SFP+ splitter cable, you can split a QSFP+ port into four line-rate 10GE SFP+ ports. Max 72*10GE supported on one single switch.

Embedded Access Controller

WatchDog Data Center Series implements the WLAN function by installing an AC feature pack on the main control unit, thereby implementing both the wired function and the WLAN function on a single device. Embedded AC isa low-cost WLAN solution, save overall investment, improve forwarding capacity, realized a true unified wired and wireless solution in Campus. Max256 AP supported on one single switches.

WatchDog Virtual Switching System (VSS)

WatchDog Virtual Switching System (VSS) virtualizes multiple Data Center Series switch (up to 9) switches into one virtual switch and provides the following benefits:

- **Scalability:** VSS allows you to add devices to the VSS system easily. It provides a single point of management, enables switch plug-and-play, and supports software auto-update for software synchronization from the master to the new member devices. It brings business agility with lower total cost of ownership by allowing new switches to be added to the fabric without network topology change as business grows.
- **High availability:** The WatchDog hot backup technology ensures redundancy and backup of all information on the control and data planes and non-stop Layer 3 data forwarding in an IRF 2 fabric.It also eliminates single point of failure and ensures service continuity.
- **Redundancy and load balancing:** The distributed link aggregation technology supports load sharing and mutual backup among multiple uplinks, which enhances the network redundancy and improves link resources usage.

- **Flexibility and resiliency:** The switch use standard GE ports instead of specialized ports for IRF links between IRF member devices. This allows customers to assign bandwidth as needed between uplink, downlink, and IRF system connections. In addition, an Data Center Series Switch VSS fabric can span a rack, multiple racks, or multiple campuses.

Wide Range of Advanced Features

The switch offers a wide range of features, including:

- **Modular hardware and software design:** The switch uses modular, hot swapping, and redundancy design for hardware, including power modules and fan trays. The switch also uses modular design for software, which enables feature installation and removal on an as-needed basis. Refined physical architecture and optimized software workflows greatly reduce the end-to-end packet processing delay.
- **Software-defined networking (SDN):** An innovative network architecture that separates the control plane from the forwarding plane, typically by using OpenFlow. SDN significantly simplifies network management, reduces maintenance complexities and costs, enables flexible traffic management, and offers a good platform for network and application innovations.
- **Virtual eXtensible LAN (VXLAN):** A MAC-in-UDP technology that provides Layer 2 connectivitybetween distant network sites across an IP network. VXLAN enables long-distance virtual machine and data mobility and is typically used in data centers and the access layer of campus networks for multitenant services. The implementation of VXLAN supports automatic VXLAN tunnel establishment with EVPN.
- **Ethernet Virtual Private Network (EVPN):** A Layer 2 VPN technology that provides both Layer 2 and Layer 3 connectivity between distant network sites across an IP network. EVPN uses MP-BGP in the control plane and VXLAN in the data plane. EVPN provides the following benefits: Configuration automation; Separation of the control plane and the data plane; Integrated routing and bridging (IRB).
- **In-Service Software Upgrade (ISSU) and Operation, Administration, and Maintenance (OAM):** Ensure business continuity and improve Ethernet management and maintainability.

Comprehensive Security Control Policies

The switch supports AAA authentications (including RADIUS authentication) and dynamic or static binding of user identifiers such as user account, IP address, MAC address, VLAN, and port number.

Using the switch in conjunction with WD Management Center, you can manage and monitor online users in real time and take prompt action on illegitimate behaviors.

The switch offers a large number of inbound and outbound ACLs and VLAN-based ACL assignment. This simplifies configurations and saves ACL resources.

MACsec

MACsec is a network security standard that operates at the medium access control layer and defines connection less data confidentiality and integrity for media access independent protocols. It provides the following services:

- **Data encryption:** Encrypts data over the Ethernet link to protect data against security issues such as eavesdropping.
- **Anti-replay:** Prevents packets from being intercepted and modified en route to protect the network against unauthorized access.
- **Tampering protection:** prevents packet tampering to protect data integrity.

MACsec supports the following deployments:

- **Client-oriented:** Protects data transmission over the link between the client and its access device.
- **Device-oriented mode:** Protects data transmission over the link between two peering devices.

High Availability

In addition to node and link protection, the switch offers the following hardware high availability features:

- 1+1 power module redundancy and 1+1 fan tray redundancy.
- Hot-swappable interface modules.
- Automatic power and fan tray status monitoring and alarming mechanisms.
- Automatic fan speed adjustment based on the change in temperature.
- Self-protection mechanisms that protect power modules against overcurrent, overvoltage, andover temperature conditions.

Outstanding Management Capacity

The switch provides a variety of management features and is easy to manage. It offers the following device management features:

- Provides multiple management interfaces, including the console port, out-of-band management Ethernet port, and USB port.
- Supports configuration and management from CLI or WD Management Center.

- Supports multiple access methods, including SNMPv1/v2c/v3, Telnet, and more secure SSH 2.0 and SSL.
- Uses OAM to enhance system management capability.
- Supports FTP for system upgrade.

Multi chassis Link Aggregation Group (M-LAG)

WatchDog Date Center series switches support M-LAG, which enables links of multiple switches to aggregate into one to implement device-level link backup. M-LAG is applicable to servers dual-homed to a pair of access devices for node redundancy.

- **Streamlined topology:** M-LAG simplifies the network topology and spanning tree configuration by virtualizing two physical devices into one logical device.
- **Independent upgrading:** The DR member devices can be upgraded independently one by one to minimize the impact on traffic forwarding.
- **High availability:** The DR system uses a keep alive link to detect multi-active collision to ensure that only one member device forwards traffic after a DR system splits.

Visualization Ability

WatchDog Data Center series switches support Telemetry technology, which can send the switch's real-time resource information and alarm information to the O&M platform through the gRPC protocol.

The platform can realize network quality backtracking, troubleshooting, risk early warning, architecture optimization and other functions to accurately guarantee user experience by analyzing real-time data.

Hardware Specifications

Item	WD-GS-24G2Q28	WD-GS-24G2Q	WD-GS-48G-2Q28	WD-GS-48G-2Q	WD-GS-48G6Q28	WD-GS-24G-6Q28	WD-GS-24P-4Q28
Port switching capacity	880Gbps	640Gbps	1360Gbps	1120Gbps	2160Gbps	1680Gbps	1280Gbps
Packet forwarding rate	655Mpps	476Mpps	1012Mpps	833Mpps	1607Mpps	1250Mpps	952Mpps
System Switching Capacity	2.56Tbps						
Dimensions (H × W × D)	43.6 × 440 × 360 mm (1.72 × 17.32 × 14.17 in)						
Weight	≤7.4KG	≤7KG	≤ 7.6KG	≤7.2KG	≤6KG	≤5.5KG	≤9.6 KG
CPU	Dual Core, 1.6GHz						
SDRAM	2GB	2GB	2GB	2GB	4GB	4GB	2GB
Flash	2GB	2GB	2GB	2GB	4GB	4GB	2GB
Packet Buffer	16M						
Console ports	1						
Management Ethernet ports	1						
USB ports	1						
1G/2.5G/5G/10G Base-T Multi-giga	-	-	-	-	-	-	24+24(optional)
SFP+	24	24	48	48	48	24	24(optional)
QSFP+	-	2	-	2	-	-	-
QSFP28	2	-	2	-	6	6	4

Item	WD-GS-24G2Q28	WD-GS-24G2Q	WD-GS-48G-2Q28	WD-GS-48G-2Q	WD-GS-48G6Q28	WD-GS-24G-6Q28	WD-GS-24P-4Q28
Expansion slots	2				-		2
Expansion modules	2-Port 10G SFP+ Ethernet Optical Interface Module 4-Port 10G SFP+ Ethernet Optical Interface Module 8-Port 10G SFP Plus Interface Card 8-Port 10G SFP+ with MACSec Interface Module 8-Port 1/2.5/5G BASE-T Ethernet Copper Interface Module 8-Port 1/2.5/5/10G BASE-T Ethernet Copper Interface Module 2-port 25GE SFP28 interface module 2-port 40GE QSFP+ interface module 8-port 25GE SFP28 interface module (for S6520X-54HC-EI) 2-port 100GE QSFP28 interface module (for S6520X-54HC-EI)				N/A		Front Slot: 24*10G/1G SFP+ ports module 24*100M/1G/2.5G/5G/10G Base-T PoE++ Ports module Rear Slot: as shown in "Removable Components Matrix"
Input voltage range	Rated: 100 VAC to 240 VAC @ 50 Hz/60 Hz Max.: 90 VAC to 264 VAC @ 47 Hz to 63 Hz Rated voltage range: –48 to –60 VDC Max voltage range: –36 to –72 VDC				Rated voltage range: 100 to 240 VAC @ 50/60 Hz Max voltage range: 90 to 264 VAC @ 47 to 63 Hz		Rated Voltage Range: 100 to 240 VAC @ 50/60 Hz Max voltage range: 90 to 290 VAC @ 47 to 63 Hz
80 PLUS (80 PLUS Certified)	-				-		Y 80 PLUS Platinum
Fan trays	2 hot swappable fan trays, adjustable speed, and invertible airflow				3 hot swappable fan trays, adjustable speed, and invertible airflow		2 hot swappable fan trays, adjustable speed, and invertible airflow
Power	2						

Item	WD-GS-24G2Q28	WD-GS-24G2Q	WD-GS-48G-2Q28	WD-GS-48G-2Q	WD-GS-48G6Q28	WD-GS-24G-6Q28	WD-GS-24P-4Q28
Supply slots							
Idle power consumption	Single AC: 38W Dual AC: 43W	Single AC: 38W Dual AC: 43W	Single AC: 44W Dual AC: 49W	Single AC: 39W Dual AC: 44W	Single AC: 29W Dual AC: 36W	Single AC: 29W Dual AC: 35W	Host+SFP module: Single AC: 74W Dual AC: 89W Host+Ethernet module: Single AC: 69W Dual AC: 82W
Max. power consumption	Single AC: 197W Dual AC: 200W	Single AC: 179W Dual AC: 183W	Single AC: 249W Dual AC: 251W	Single AC: 231W Dual AC: 234W	Single AC: 163W Dual AC: 162W	Single AC: 131W Dual AC: 134W	Host+SFP module Single AC: 1580W Dual AC: 2487W Host+Ethernet module: Single AC: 1595W Dual AC: 3061W
Operating Temperaturer	-5℃ to 50℃ (23℉to 113℉) -60m-5000m altitude: From 0m, the maximum operating temperature reduce by 0.33℃ for every time 100 the altitude increases by 100m.						
Storage Temperature	-40℃ to 70℃(-40℉ to 158℉)						
Operating & storage humidity	5% RH to 95% RH, non-condensing						
MTBF (Year)	63.4	62.8	60.8	60.2	60.8	63.4	61.7

Item	WD-GS-24G2Q28	WD-GS-24G2Q	WD-GS-48G-2Q28	WD-GS-48G-2Q	WD-GS-48G6Q28	WD-GS-24G-6Q28	WD-GS-24P-4Q28
MTTR (Hour)	1	1	1	1	1	1	1

Software Specifications

Feature	Date Center 10G Core switch series
VLAN	VLAN ID range 0 to 4095(Total 4096) Access/Trunk/Hybrid VLAN port-based VLAN MAC-based VLAN IP subnet-based VLAN protocol-based VLAN IEEE 802.1P(CoS priority) Super VLAN Private VLAN Voice VLAN QinQ(802.1Q-in-802.1Q) and flexible QinQ Vlan mapping Static/Dynamic/Blackhole/Multiport unicast MAC MAC automatic learning and aging port-based/VLAN-based MAC learning limit MAC filter Port isolation IEEE 802.3x flow control (full duplex) Storm suppression based on port rate percentage PPS-based storm suppression BPS-based storm suppression Loop detection(VLAN and VXLAN network) MVRP(Multiple VLAN Registration Protocol) GVRP(Generic VLAN Registration Protocol) STP(Spanning tree protocol) RSTP(Rapid Spanning Tree Protocol)

Feature	Date Center 10G Core switch series
	MSTP(Multiple Spanning Tree Protocol) PVST(Per-VLAN Spanning Tree) (compatible with PVST+/RPVST+) BPDU/root/loop/TC-BPDU/PVST BPDU/disputeloopback guard BPDU filter Role/TC-BPDU transmission restriction LLDP(Link Layer Discovery Protocol) and LLDP-MED(Link Layer Discovery Protocol Media Endpoint Discovery) DCBX(Data Center Bridging Exchange Protocol) Broadcast/multicast/unknown unicast storm constrain Jumbo frame(maximum frame length supported is 13312) Store-and-forward(Default) Cut-through-forward
Ethernet link aggregation	Static aggregation Dynamic aggregation S-MLAG(Simple multichassis link aggregation) 10GE/25G/40GE/100GE port aggregation LACP(Link Aggregation Control Protocol) M-LAG(Multichassis Link Aggregation)
IP Services	Static/Dynamic/Gratuitous/proxy ARP ARP snooping/fast-reply/direct route advertisement/ping ARP attack detection ARP source suppression Ping, Tracert DHCP(Dynamic Host Configuration Protocol) DHCP Server/relay agent/client/snooping DHCP Option 43, Option 82, and Option 184, DNS(Domain Name System) DDNS(Dynamic Domain Name System) mDNS(Multicast Domain Name System) IRDP(ICMP Router Discovery Protocol) UDP helper ND(Neighbor Discovery) ND snooping/proxy/direct route advertisement/ping DHCPv6 Server/relay agent/client/snooping/guard

Feature	Date Center 10G Core switch series
	GRE(Generic Routing Encapsulation) HTTP redirect GRE tunneling VXLAN tunneling and VXLAN-DCI tunneling IPv4/IPv6 over IPv4 tunneling, and IPv4/IPv6 over IPv6 tunneling IPv4/IPv6 Fast Fowarding
Routing	Static routing, RIP, OSPF, IS-IS, and BGP IPv6 static routing, RIPng, OSPFv3, IS-ISv6, and BGP4+ IPv4/IPv6 dual stack IPv4/IPv6 ECMP(Equal-cost multi-path routing) IPv4/IPv6 PBR(Policy-based routing) IPv4/IPv6 Routing policy Pingv6, Telnetv6, FTPv6, TFTPv6, DNSv6, ICMPv6 Dual-stack PBR(policy-based routing)
Multicast	PIM-DM, PIM-SM, PIM-SSM, and Any-RP PIM snooping MSDP(Multicast Source Discovery Protocol) IGMPv1/IGMPv2/IGMPv3 IGMP proxying IGMP Snooping IGMP snooping proxying IGMP Filter and IGMP Fast leave IPv6 PIM-DM, PIM-SM, PIM-SSM, and Any-RP IPv6 PIM snooping MLDv1/MLDV2 MLD proxying MLD Snooping MLD snooping proxying Multicast routing and forwarding Multicast VLAN MVPN(Multicast VPN) Multicast policy and Multicast QoS
ACL/QoS	ACL(Access Control List) advanced ACL

Feature	Date Center 10G Core switch series
	User-defined ACL Ingress and Egress ACL Ingress/Egress CAR Diff-Serv QoS Eight queues each interface 802.1P/DSCP Priority marking and remarking 802.1p, TOS, DSCP, and EXP priority mapping Flexible queue scheduling algorithms including SP, WRR, SP+WRR Traffic shaping Traffic redirecting Layer 2 to Layer 4 packet filtering Time ranges Traffic classification based on source MAC, destination MAC, source IP, destination IP, port, protocol, and VLAN Congestion avoidance, Tail-Drop, RED(Random Early Detection) and WRED(Weighted Random Early Detection)
MPLS	Static LSP(label switched path) LDP(Label Distribution Protocol) IPv6 LDP Tunnel policies VRF(Virtual Routing and Forwarding) MPLS L2VPN MPLS L3VPN MPLS Ping/Tracert MCE(Multi-VPN Instance Customer Edge) IPv6 MCE MPLS OAM
Security	RBAC(Role-based access control) AAA(Authentication, Authorization, and Accounting) RADIUS(Remote Authentication Dial-In User Service) TACACS(Terminal Access Controller Access Control System) WDTACACS(WD Terminal Access Controller Access Control System) (Same authentication processes and implementations with TACACS+) User hierarchical management and password protection

Feature	Date Center 10G Core switch series
	802.1X authentication Portal authentication MAC authentication Web authentication Triple authentication Guest VLAN SILS (Secure Interoperable LAN Standard)(IEEE 802.10) Port security IP/Port/MAC binding SSH1.x and SSH2.0(Secure Shell) SSL(Secure Sockets Layer) HTTPs Public Key Infrastructure (PKI) Control Plane Protection (CoPP), Wireless Intrusion Prevention System (WIPS) Attack detection and prevention TCP attack prevention IPSG(IP source guard) IPv6 RA Guard ARP attack protection ND attack protection uRPF(Unicast Reverse Path Forwarding) MFF(MAC-forced forwarding) SAVI(Source Address Validation Improvement) FIPS(Federal Information Processing Standards) MACsec(Media Access Control Security) All ports AES256 MACsec Microsegmentation Hierarchical user management and password protection EAD(Endpoint Admission Defense) Basic and advanced ACLs for packet filtering OSPF, RIPv2, BGPv4 plain text and MD5 authentication
High Availability	Ethernet OAM(IEEE 802.3ah) CFD(Connectivity Fault Detection)(IEEE 802.1ag and ITU-T Y.1731) DLDP(Device Link Detection Protocol) RRPP(Rapid Ring Protection Protocol)

Feature	Date Center 10G Core switch series
	ERPS(G.8032 Ethernet Ring Protection Switching) Smart Link Monitor Link VRRPv2(Virtual Router Redundancy Protocol) VRRPv3 BFD(Bidirectional forwarding detection) Hardware BFD BFD for VRRP/BGP/IS-IS/OSPF/RSVP/static routing, with a failover detection time less than 50 milliseconds Track Process redundancy/placement CPU protection Hot patching, online patch upgrade Link aggregation VCT(virtual cable test) Smart-Link ISSU(In-Service Software Upgrade)
Network Management	NQA(Network quality analyzer) iNQA(Intelligent Network Quality Analyzer) eMDI(Enhanced Media Delivery Index) Performance management through gRPC or NETCONF NTP(Network Time Protocol) PTP(Precision Time Protocol) IEEE 1588 version 2/IEEE 802.1AS/SMPTE ST 2059-2/AES67-2015 SNMPv1/SNMPv2c/SNMPv3 Public Cloud management RMON(Remote Network Monitoring) and groups 1,2,3 and 9 NETCONF/YANG EAA(Embedded Automation Architecture) Port mirroring SPAN(Switch Port Analyzer)/RSPAN(Remote SPAN)/ERSPAN(Encapsulated remote SPAN) Flow mirroring N:4 port mirroring local and remote port mirroring NetStream/IPv6 NetStream, traffic analysis sampling ratio 1:1

Feature	Date Center 10G Core switch series
	sFlow Information center VCF(Virtual Converged Framework) Fault alarm and automatic fault recovery System logs Alarming based on severity Power, fan, and temperature alarming Debugging information output Device status monitoring mechanism, including the CPU engine, backplane, chips and other key components Configuration through CLI, Telnet, and console port Zero Touch Provisioning DHCP auto-config CWMP(CPE WAN Management Protocol/TR-069) Job scheduler Loading and upgrading through XModem/FTP/TFTP/SFTP/USB Secure Boot Embedded AC, maximum support management 2K AP iMC network management system SmartMC(embedded Smart Graphical Management Center)(built-in Web GUI)
Stacking	VSS (Virtual Switching System) Distributed device management Distributed link aggregation Distributed resilient routing Stacking through standard Ethernet ports Local device stacking and remote device stacking LACP-, BFD-, and ARP-based multi-active detection (MAD)
Automatic Configuration	Server-based automatic configuration USB-based automatic configuration
Programmability and Automation	Ansible Auto DevOps by using Python, NETCONF, TCL, and Restful APIs for automated network programming
Visualization	gRPC(Google remote procedure call) INT(Inband Telemetry)

Feature	Date Center 10G Core switch series
	Flow group MOD(Mirror On Drop)
OpenFlow	OpenFlow 1.3 Multiple controllers (EQUAL, master/slave) Multiple tables flow Group table
VXLAN	VXLAN L2 switching VXLAN L3 routing Centralized VXLAN gateway Distributed VXLAN gateway VXLAN M-LAG VXLAN-DCI OVSDB(Open vSwitch Database) VXLAN VTEP MP-BGP EVPN control plane EVPN VXLAN EVPN M-LAG
Intelligent Lossless Network	PFC(Priority-based Flow Control) ECN(Explicit Congestion Notification)
Energy Saving	Port automatic power down function Port timing down function (Schedule job) EEE(802.3az Energy Efficient Ethernet)
EMC	FCC Part 15 Subpart B CLASS A CISPR 32 CLASS A EN 55032 CLASS A CISPR 35 EN 55035 EN 61000-3-2 EN 61000-3-3

Feature	Date Center 10G Core switch series
Safety	IEC 62368-1 EN 62368-1 EN 60825-1 EMI/EMC
RoHS	RoHS2.0

Performance Specification

Model	Date Center 10G Core switch series
MAC address entries(max)	165215
VLAN table	4094
VLAN interface	1024
IPv4 routing entries(max)	95,536
IPv4 ARP entries(max)	95,536
IPv4 ACL entries	Ingress:2048 Egress:256
IPv4 multicast L2 entries	4000
IPv4 multicast L3 entries	4000
IPv6 unicast routing entries	82,768
QOS forward queues	8
IPv6 ACL entries	Ingress:2048 Egress:256
IPv6 ND entries	32,768
IPv6 multicast L2 entries	2000
IPv6 multicast L3 entries	2000
Jumbo frame length	10000
Max Stacking Devices	9
Max Stacking Bandwidth	480Gbps

Standards and Protocols Compliance

Organization	Standards and Protocols
IEEE	802.1x Port based network access control protocol
	802.1ab Link Layer Discovery Protocol
	802.1ak MVRP and MRP
	802.1ax Link Aggregation
	802.1d Media Access Control Bridges
	802.1p Priority
	802.1q VLANs
	802.1s Multiple Spanning Trees
	802.1ag Connectivity Fault Management
	802.1v VLAN classification by Protocol and Port
	802.1w Rapid Reconfiguration of Spanning Tree
	802.3ad Link Aggregation Control Protocol
	802.3ah Ethernet in the First Mile
	802.3bt PoE++
	802.3x Full Duplex and flow control
	802.3z 1000BASE-X
	802.3ae 10-Gigabit Ethernet
	802.3an 10-Gigabit Base-T Ethernet
	802.3by 25G Ethernet
	802.3ba 40/100G Ethernet
IETF	RFC 2710 Multicast Listener Discovery (MLD) for IPv6
	RFC 2711 IPv6 Router Alert Option
	RFC 2787 Definitions of Managed Objects for the Virtual Router Redundancy Protocol
	RFC 2918 Route Refresh Capability for BGP-4
	RFC 2925 Definitions of Managed Objects for Remote Ping, Traceroute, and Lookup Operations
	RFC 2934 Protocol Independent Multicast MIB for IPv4
	RFC 3101 OSPF Not-so-stubby-area option
	RFC 3019 MLDv1 MIB
	RFC 3046 DHCP Relay Agent Information Option

Organization	Standards and Protocols
	RFC 3056 Connection of IPv6 Domains via IPv4 Clouds
	RFC 3065 Autonomous System Confederation for BGP
	RFC 3137 OSPF Stub Router Advertisement sFlow
	RFC 3376 IGMPv3
	RFC 3416 (SNMP Protocol Operations v2)
	RFC 3417 (SNMP Transport Mappings)
	RFC 3418 Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)
	RFC 3484 Default Address Selection for IPv6
	RFC 3509 Alternative Implementations of OSPF Area Border Routers
	RFC 3580 IEEE 802.1X Remote Authentication Dial In User Service (RADIUS) Usage Guidelines
	RFC 3623 Graceful OSPF Restart
	RFC 3768 Virtual Router Redundancy Protocol (VRRP)
	RFC 3810 Multicast Listener Discovery Version 2 (MLDv2) for IPv6
	RFC 3973 PIM Dense Mode
	RFC 4022 MIB for TCP
	RFC 4113 MIB for UDP
	RFC 4213 Basic Transition Mechanisms for IPv6 Hosts and Routers
	RFC 4251 The Secure Shell (SSH) Protocol
	RFC 4252 SSHv6 Authentication
	RFC 4253 SSHv6 Transport Layer
	RFC 4254 SSHv6 Connection
	RFC 4271 A Border Gateway Protocol 4 (BGP-4)
	RFC 4273 Definitions of Managed Objects for BGP-4
	RFC 4291 IP Version 6 Addressing Architecture
	RFC 4292 IP Forwarding Table MIB
	RFC 4293 Management Information Base for the Internet Protocol (IP)
	RFC 4360 BGP Extended Communities Attribute
	RFC 4419 Key Exchange for SSH
	RFC 4443 ICMPv6

Organization	Standards and Protocols
	RFC 4456 BGP Route Reflection: An Alternative to Full Mesh Internal BGP (IBGP)
	RFC 4486 Subcodes for BGP Cease Notification Message
	RFC 4541 IGMP & MLD Snooping Switch
	RFC 4552 Authentication/Confidentiality for OSPFv3
	RFC 4601 PIM Sparse Mode
	RFC 4607 Source-Specific Multicast for IP
	RFC 4724 Graceful Restart Mechanism for BGP
	RFC 4750 OSPFv2 MIB partial support no SetMIB
	RFC 4760 Multiprotocol Extensions for BGP-4
	RFC 4861 IPv6 Neighbor Discovery
	RFC 4862 IPv6 Stateless Address Auto-configuration
	RFC 4940 IANA Considerations for OSPF
	RFC 5059 Bootstrap Router (BSR) Mechanism for PIM, PIM WG
	RFC 5065 Autonomous System Confederation for BGP
	RFC 5095 Deprecation of Type 0 Routing Headers in IPv6
	RFC 5187 OSPFv3 Graceful Restart
	RFC 5340 OSPFv3 for IPv6
	RFC 5424 Syslog Protocol
	RFC 5492 Capabilities Advertisement with BGP-4
	RFC 5519 Multicast Group Membership Discovery MIB (MLDv2 only)
	RFC 5798 VRRP (exclude Accept Mode and sub-sec timer)
	RFC 5880 Bidirectional Forwarding Detection
	RFC 5905 Network Time Protocol Version 4: Protocol and Algorithms Specification
	RFC 6620 FCFS SAVI
	RFC 6987 OSPF Stub Router Advertisement
	RFC6020 YANG - A Data Modeling Language for the Network Configuration Protocol (NETCONF)
	RFC7348 Virtual eXtensible Local Area Network (VXLAN): A Framework for Overlaying Virtualized Layer 2 Networks over Layer 3 Networks
	RFC7432 BGP MPLS-Based Ethernet VPN

Organization	Standards and Protocols
	RFC4664 Framework for Layer 2 Virtual Private Networks (L2VPNs)
	RFC4665 Service Requirements for Layer 2 Provider Provisioned Virtual Private Networks
	RFC4761 Virtual Private LAN Service (VPLS) Using BGP for Auto-Discovery and Signaling
	RFC4762 Virtual Private LAN Service (VPLS) Using Label Distribution Protocol (LDP) Signaling
	RFC5120 M-ISIS: Multi Topology (MT) Routing in Intermediate System to Intermediate Systems (IS-ISs)
	RFC5280 Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile
	RFC5308 Routing IPv6 with IS-IS
	RFC5381 Experience of Implementing NETCONF over SOAP
	RFC5415 Control and Provisioning of Wireless Access Points (CAPWAP) Protocol Specification
ITU	ITU-T Y.1731
	ITU-T Rec G.8032/Y.1344 Mar. 2010

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